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(71) Applicant
Britax (Wingard) Limited

(Incorporated in United Kingdom)

Chandler Road, Chichester, West Sussex PO19 2UG

(72) Inventor
Robert Frederick Else

(74) Agent and/or Address for Service
**A Hollinghurst, Britax Limited (Patents), Kingsham Road,
Chichester, West Sussex**

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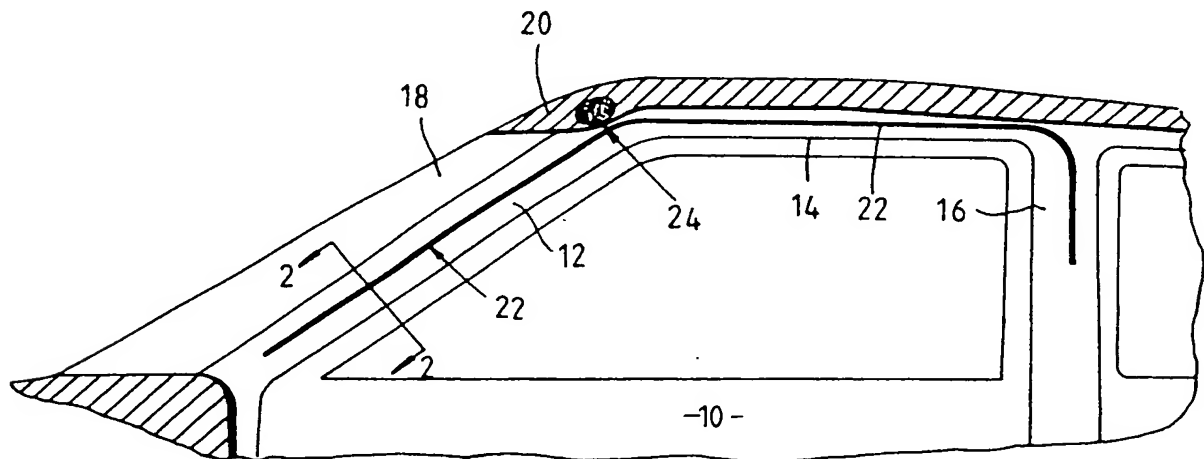
(56) Documents cited
GB 1555373 GB 1389503 GB 1281229
GB 1450666 GB 1381999 WO A1 80/01267

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(54) **Inflatable vehicle occupant protection**

(57) In order to guard against head contact with the vehicle structure in the event of an accident, a motor vehicle has inflatable tubes 22 and 24 extending along and secured to its A-post 12, its cant rail 14 and its B-post 16 and its header rail 20. Inertia responsive means are arranged to effect inflation of the tubes 22 and 24 in the event that the vehicle is subject to acceleration above a threshold value.

FIG. 1.



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FIG. 1.

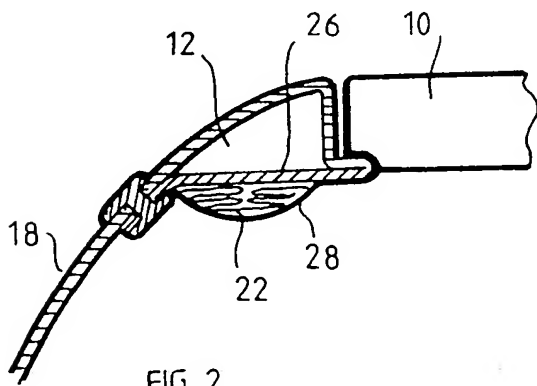
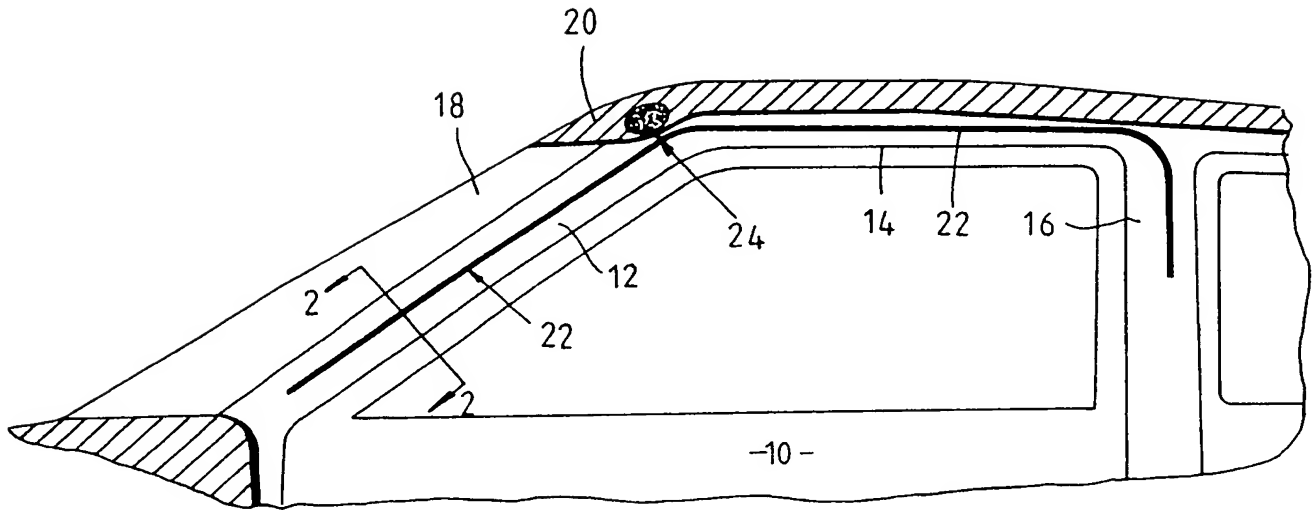


FIG. 2.

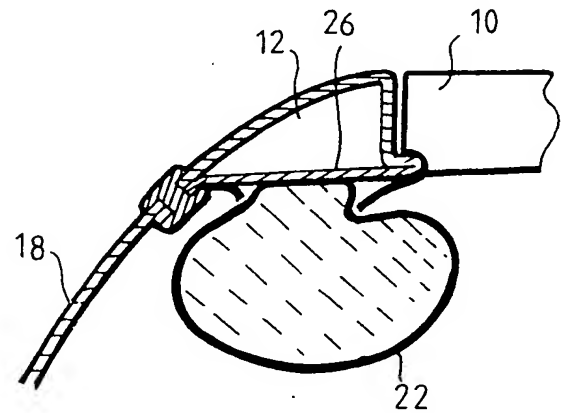


FIG. 3.

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SPECIFICATION

Inflatable vehicle occupant protection

5 This invention relates to an inflatable device for protecting vehicle occupants from the consequences of collision with the structure of the vehicle interior.

It is already known to provide a passenger vehicle with so-called airbags which are located in the vicinity of the fascia of the passenger compartment and which are arranged to be inflated by a pyrotechnic device when the vehicle is subject to sudden deceleration, for example such as is encountered when the vehicle is involved in an accident. Such airbags are intended to be used instead of safety belts but they have the disadvantage that, when inflated, they interfere both with the driver's field of view and with his access to the controls of the vehicle. They may therefore prevent him from taking evasive action to minimise the consequences of an accident. The present invention aims to provide an inflatable device which can be used as a supplement to other vehicle occupant restraint means, which does not seriously affect the driver's field of view or access to the vehicle controls and which is particularly adapted to provide useful protection in the event that the vehicle is subject to sudden lateral acceleration.

According to the invention, a vehicle occupant protection device comprises at least one inflatable tube extending along and secured to at least one structural member of the passenger compartment of the vehicle bounding a window, and inertia responsive means for effecting inflation of the tube in the event that the vehicle is subject to acceleration in at least one direction above a threshold value.

Preferably said predetermined direction is a horizontal transverse direction relative to the vehicle.

45 An embodiment of the invention will now be described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a longitudinal sectional view of a motor car fitted with a restraint device in accordance with the invention, taken on the longitudinal centre line of the vehicle;

Figure 2 is a cross-sectional view taken on the line 2-2 in *Fig. 1*, with the tube deflated;

Figure 3 is a cross-sectional view, similar to *Fig. 2*, but with the tube inflated.

Referring first to *Fig. 1*, one of the front doors 10 of a motor car is bounded by an A-post 12, a cant rail 14, and a B-post 16, as is conventional. The vehicle has a windscreen 18 supported on the A-post 12 and bounded on its upper edge by a header rail 20. A first flexible tube 22 in accordance with the invention extends up the A-post 12, along the cant rail 14 and part way down the B-post 16. A second tube 24 extends along the header rail

20. Referring now to *Figs. 2* and *3*, the flexible tube 22 is secured to the inner face 26 of the A-post 12 and is similarly secured to the cant rail 14 and B-post 16. In its uninflated condition shown in *Fig. 2*, the tube 22 is either rolled or folded concertina fashion and covered by a rupturable trim piece 28. The mounting of the tube 24 on the header rail is similar.

70 A pyrotechnic generator (not shown) is connected so as to inflate the tubes 22 and 24 when detonated. The pyrotechnic generator has an inertia sensitive detonator (not shown) arranged to cause the pyrotechnic generator to inflate the tubes 22 and 24 when the vehicle is subject to oblique or side impact. These are the conditions where there is a particular danger that an occupant's head might make violent contact with the structure of the vehicle.

When fully inflated, the tubes 22 and 24 provide large padded surfaces without materially affecting the field of view of the driver or his access to the vehicle controls. It will, therefore, not usually be necessary to provide deflation holes in the tubes 22 and 24 so that they deflate slowly as time passes following detonation of the pyrotechnic charge. However, such deflation holes may be provided if desired.

It is not necessary for the tube 22 to be continuous. A series of separate tubes may be provided. Alternatively, the tube 24 may be replaced by a branch of the tube 22. Where separate tubes are provided, each tube may be connected to its own pyrotechnic generator so that each tube can be inflated individually as appropriate.

The system may be arranged to inflate the tubes 22 and 24 in response to longitudinal acceleration as well as or instead of lateral acceleration. When the invention is used as a supplement to a conventional airbag system, a common inertia sensor system may be employed.

CLAIMS

1. A vehicle having an occupant protection device comprising at least one inflatable tube extending along and secured to at least one structural member of the passenger compartment of the vehicle bounding a window, and inertia responsive means for effecting inflation of the tube in the event that the vehicle is subjected to acceleration in at least one direction above a threshold value.

2. A vehicle according to claim 1, wherein said predetermined direction is a horizontal transverse direction relative to the vehicle.

3. A vehicle according to claim 1 or 2, wherein a first inflatable tube extends along the A-post, the cant rail and the B-post of the vehicle and a second inflatable tube extends along the header rail thereof.

4. A vehicle according to claim 1 or 2,

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- wherein a single inflatable tube has a first branch extending along the A-post, the cant rail and the B-post of the vehicle and a second branch extending along the header rail thereof.
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